CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE SOUTH FORK HOLSTON RIVER WATERSHED

5.1. BACKGROUND. The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the South Fork Holston River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

5.2.A. Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance & Results Measurement System (PRMS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRMS may be viewed at http://prms.nrcs.usda.gov/prms. From the opening menu, select "Reports," then select the Conservation Treatment of interest on the page that comes up. Select the desired location and time period from the drop down menus and choose "Refresh." Choose "by HUC" in the "Location" option and choose "Refresh" again.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

CONSERVATION PRACTICE	TOTAL
Comprehensive Nutrient Management Plans (Number)	0
Conservation Buffers (Acres)	41
Erosion Reduction (Tons/Year)	3,073
Inventory and Evaluations (Number)	25
Irrigation Management (Acres)	0
Nutrient Management (Acres)	1,381
Pest Management (Acres)	1,500
Prescribed Grazing (Acres)	74
Residue Management (Acres)	1
Tree and Shrub Practices (Acres)	16
Waste Management (Number)	0
Wetlands Created, Restored, or Enhanced (Acres)	9
Wildlife Habitat (Acres)	737

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period. More information is provided in SF Holston - Appendix V.*

5.2.B. United States Geological Survey Water Resources Programs – Tennessee District**.** The U.S. Geological Survey (USGS) provides relevant and objective scientific studies and information for public use to evaluate the quantity, quality, and use of the Nation's water resources. In addition to providing National assessments, the USGS also conducts hydrologic studies in cooperation with numerous Federal, State, and local agencies to address issues of National, regional, and local concern. Please visit http://water.usgs.gov/ for an overview of the USGS, Water Resources Discipline.

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 89 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (http://bqs.usgs.gov/acidrain/), National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa/).

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at http://waterdata.usgs.gov/tn/nwis/nwis. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov for specific information about streamflow data.

Recent publications by the USGS staff in Tennessee can be accessed by visiting http://tn.water.usgs.gov/pubpg.html. This web page provides searchable bibliographic information to locate reports and other products about specific areas.

5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program. Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. For a complete listing of endangered and threatened species in the South Fork Holston River watershed, please visit the Service's website at http://www.cookeville.fws.gov.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

In a partnership with the Tennessee Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Heritage, the Service is developing a State Conservation Agreement for Cave Dependent Species in Tennessee (SCA). The SCA targets unlisted but rare species and protects these species through a suite of proactive conservation agreements. The goal is to preclude the need to list these species under the ESA. This agreement will cover middle and eastern Tennessee and will benefit water quality in many watersheds within the State.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

Partners for Fish and Wildlife Program. The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types which benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

How To Participate:

- Interested landowners contact a “Partners for Fish and Wildlife” Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.
- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service’s Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).

- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Cookeville Ecological Services Field Office at 931/528-6481 or visit their website at http://www.cookeville.fws.gov.

5.2.D. Tennessee Valley Authority (TVA). Tennessee Valley Authority (TVA). TVA's goals for the 21st century are to generate prosperity for the Tennessee Valley by promoting economic development, supplying low-cost, reliable power, and supporting a thriving river system. TVA is committed to the sustainable development of the region and is engaged in a wide range of watershed protection activities. TVA formed 12 multidisciplinary Watershed Teams to help communities across the Tennessee Valley actively develop and implement protection and restoration activities in their local watersheds. These teams work in partnership with business, industry, government agencies, and community groups to manage, protect, and improve the quality of the Tennessee River and its tributaries. TVA also operates a comprehensive monitoring program to provide real-time information to the Watershed Teams and other entities about the conditions of these resources. The following is a summary of TVA's resource stewardship activities in the South Fork Holston watershed.

VITAL SIGNS MONITORING

Reservoir Monitoring. TVA has monitored the quality of water resources of South Holston, Boone and Fort Patrick Henry Reservoirs regularly as part of its Vital Signs Monitoring effort since 1991. Physical, chemical, and biological indicators (dissolved oxygen, chlorophyll, sediment chemistry, benthos, and fish) provide information from various habitats on the ecological health of the reservoirs. These parameters are sampled on Boone Reservoir at mid-reservoir (WRM 6.5), and near Boone Dam (SFHRM 19.00). Sampling on South Holston Reservoir is done at mid-reservoir (SFHRM 60.00) and near South Holston Dam (SFHRM 50.0). Sampling on Fort Patrick Henry Reservoir is done at Fort Patrick Henry Dam (SFHRM 8.2).

Numeric ratings are given to all of the indicators sampled at each station. The lowest possible rating for any indicator is 1 (poorest condition) while the highest rating is 5 (best condition). Sediment chemistry is an exception; 0.5 is the lowest rating, 2.5 the highest. This information is used to evaluate conditions at each location as well as to develop an ecological health score for the reservoir. To obtain this score, ratings from all locations are summed and divided by total possible points for the reservoir. The result is then multiplied by 100. The lowest possible score is 20, the highest is 100.

The following charts present Reservoir Vital Signs scores for each year for which data are comparable. Boone rated poor in 2001—continuing a trend of poor to fair ratings since TVA began monitoring it in 1991. Conditions in 2001 were much better, however, than when the reservoir was last monitored in 1999. The 1999 score was the lowest ever observed in TVA monitoring—primarily because dissolved oxygen, chlorophyll, and

bottom life rated poor at more monitoring sites. Meteorological conditions and related changes in reservoir flows appear to a significant factor in the differences among years.

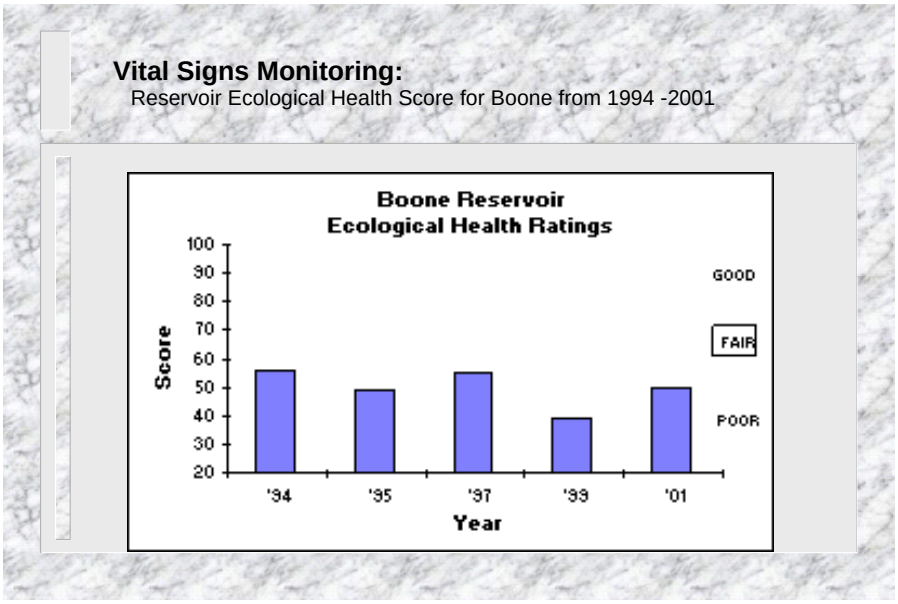

Figure 5-1. Vital Signs Monitoring for Boone Reservoir (1994-2001)

TVA monitored South Holston Reservoir annually from 1991 through 1994 to establish baseline data on the reservoir's ecological health under a range of weather and flow conditions. South Holston is now evaluated every other year.

South Holston Reservoir rated poor in 2000. Conditions were similar to those observed in 1996 and 1998. South Holston rated fair in previous years primarily because of improved ratings for chlorophyll and bottom life.

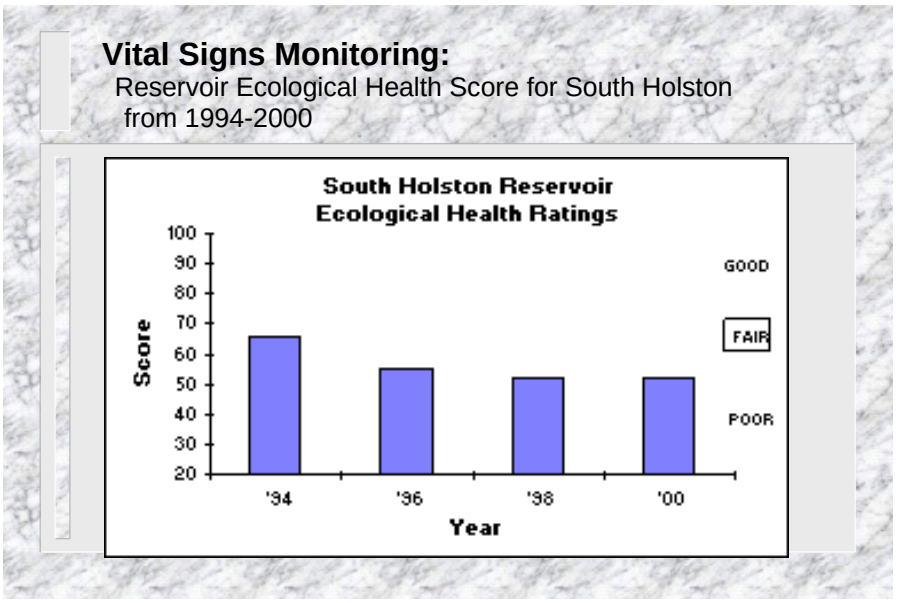

Figure 5-2. Vital Signs Monitoring for South Holston Reservoir (1994-2000)

TVA monitored Fort Patrick Henry Reservoir annually from 1993 to 1997 to establish baseline data on the reservoir's ecological health under a range of weather and flow conditions. Fort Patrick Henry is now monitored every other year. The fair rating in 2001 was a slight improvement over previous years, but not appreciably different. The main issues in Fort Patrick Henry are consistent from year to year—generally high chlorophyll concentrations and fair to poor ratings for fish, bottom life and sediment.

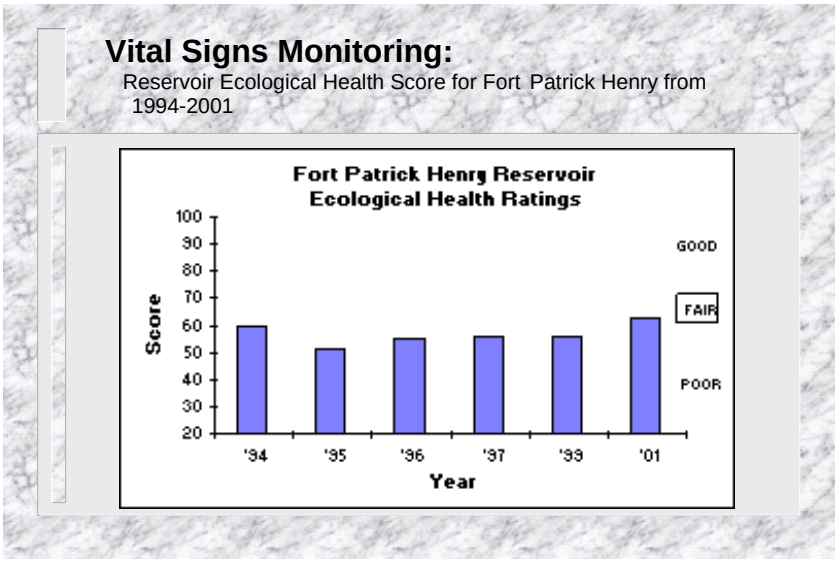

Figure 5-3. Vital Signs Monitoring for Fort Patrick Henry Reservoir (1994-2001)

Bacteriological Sampling. Five sites on Boone Reservoir were sampled ten times each for fecal coliform bacteria in 2002. All sites except Pickens Bridge boat ramp on Boone Reservoir met the State of Tennessee bacteriological water quality criteria for water contact recreation [Tennessee's criteria for water contact recreation requires the collection of at least 10 fecal coliform samples within a 30 day period, with a geometric mean less than 200 fecal coliform colonies per 100 milliliters of water. Also, no single sample should exceed 1,000 colonies per 100 milliliters.]. At Pickens Bridge boat ramp one sample exceeded 1000 colonies per 100 milliliters. Five sites on South Holston Reservoir were sampled ten times for fecal coliform in 2000. A likely source of contamination is the large numbers of Canadian geese present at this site. The following sites met state guidelines for water contact: Laurel Yacht Club Marina, Painter Creek Dock swimming area, and Observation Knob Park swimming area. Two sites on Fort Patrick Henry Reservoir were sampled for fecal coliform bacteria in 2001. Elevated bacteria levels were found in several samples collected at Warriors' Path State Park where large numbers of Canada geese are present and are a likely source of contamination. However, there are no State of Tennessee swimming advisories on Boone, South Holston or Fort Patrick Henry Reservoirs. Samples were collected at the following locations:

Reservoir/River	Site Name	Location	Type of Site
Boone	Boone Dam TVA Beach	SHRM 18.7	swim
Boone	Jays Dock Boat Ramp	WRM 5.5L	boat ramp
Boone	Pickens Bridge Boat Ramp	WRM 5.9L	boat ramp
Boone	Wing Deer Park	WRM 10.7	swim
Boone	Bluff City Park	SFHRM 34.5	swim
Fort Patrick Henry	Warrior Path State Park Beach	SHRM 11.8	swim
Fort Patrick Henry	Warrior Path State Park Swim Area	SHRM 11.8	swim
South Holston	Laurel Yacht Club Marina	SHRM 57.6R	boat ramp
South Holston	Painter Creek Dock Swim Area	SHRM 60.0R	swim
South Holston	Observation Knob Park (formerly Sullivan County Park)	SHRM 60.5R	swim
South Holston	Washington County Park	SFHRM 62.2	swim
South Holston	TVA Access Area 6 (Whitaker Hollow)	SFHRM 70.8	canoe

Swimming beaches are scheduled for sampling every year and boat ramps every other year. Data from this sampling effort is shared in a timely manner with TDEC's Division of Water Pollution Control.

Fish Flesh Toxic Contaminants. The State of Tennessee has issued a precautionary advisory for catfish and carp from Boone Reservoir because of PCB and chlordane contamination. The last time TVA sampled Boone was in autumn 1997. Channel catfish fillets were analyzed for pesticides, PCBs, and metals and largemouth bass for mercury. The results, which were provided to state agencies for appropriate action, were similar to previous years. There are no fish consumption advisories on South Holston and Fort Patrick Henry Reservoirs. The last time TVA sampled channel catfish and largemouth bass from South Holston Reservoir was in autumn 2000. All contaminant levels were either below detectable levels or below the levels used by the state to issue fish consumption advisories. TVA will analyze fish from South Holston again in the autumn of 2004. The last time TVA sampled channel catfish and largemouth bass from Fort Patrick Henry Reservoir was in autumn 1997. All contaminant levels were either below detectable levels or below the levels used by the state to issue fish consumption advisories.

Further information on Vital Signs Monitoring can be obtained by writing to Tyler Baker at: Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee, 37402 or calling him at 423-876-6733. Email address: tfbaker@tva.gov

STREAM BIOASSESSMENT

The condition of water resources in South Fork Holston watershed streams is measured using three independent methods; Index of Biotic Integrity (IBI), number of mayfly, stonefly, and caddisfly taxa (EPT), and Habitat Assessment. Not all of these tools were used at each stream sample site.

IBI. The index of biotic integrity (IBI) assesses the quality of water resources in flowing water by examining a stream's fish assemblage. Fish are useful in determining long-term (several years) effects and broad habitat conditions because they are relatively long-lived and mobile. Twelve metrics address species richness and composition, trophic structure (structure of the food chain), fish abundance, and fish health. Each metric reflects the condition of one aspect of the fish assemblage and is scored against reference streams in the region known to be of very high quality. Potential scores for each of the twelve metrics are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site. The following table associates IBI ranges with attributes of fish assemblages.

Attributes	IBI Range
Comparable to the best situations without influence of man; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with full array of age and sex classes; balanced trophic structure.	58-60
Species richness somewhat below expectation, especially due to loss of most intolerant forms; some species with less than optimal abundance or size distribution; trophic structure shows some signs of stress.	48-52
Signs of additional deterioration include fewer intolerant forms, more skewed trophic structure (e.g., increasing frequency of omnivores); older age classes of top predators may be rare.	40-44
Dominated by omnivores, pollution-tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.	28-34
Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites, fin damage, and other anomalies regular.	12-22

EPT. The number and types of aquatic insects, like fish, are indicative of the general quality of the environment in which they live. Unlike fish, aquatic insects are useful in determining short-term and localized impacts because they are short-lived and have limited mobility. The method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

Habitat Assessment. The quality and quantity of habitat (physical structure) directly affect aquatic communities. Habitat assessments are done at most stream sampling sites to help interpret IBI and EPT results. If habitat quality at a site is similar to that found at a good reference site, any impacts identified by IBI and EPT scores can reasonably be attributed to water quality problems. However, if habitat at the sample site differs considerably from that at a reference site, lower than expected IBI and EPT scores might be due to degraded habitat rather than water quality impacts.

The habitat assessment method used by TVA (modified EPA protocol) compares observed instream, channel, and bank characteristics at a sample site to those expected at a similar high-quality stream in the region. Each of the stream attributes listed below is given a score of 1 (poorest condition) to 4 (best condition). The habitat score for the sample site is simply the sum of these attributes. Scores can range from a low of 10 to a high of 40.

1. Instream cover (fish)
2. Epifaunal substrate
3. Embeddedness
4. Channel Alteration
5. Sediment Deposition
6. Frequency of Riffle
7. Channel Flow Status
8. Bank vegetation protection - Left bank and right bank, separately
9. Bank stability - Left bank and right bank, separately
10. Riparian vegetation zone width - Left bank and right bank, separately

Sample Site Selection. EPT sampling and fish community assessment (IBI) are conducted at the same sites. Site selection is governed primarily by study objectives, stream physical features, and stream access. TVA's objective is to characterize the quality of water resources within a watershed (11-digit hydrologic unit). Sites are typically located in the lower end of sub-watersheds and at intervals on the mainstem to integrate the effects of land use. A total of 27 sites are sampled in the South Holston drainage. These sites are typically sampled every five years to keep a current picture of watershed condition.

Details about stream bioassessment sampling sites and scores can be obtained by writing Charles Saylor at Tennessee Valley Authority, PO Box 920, Ridge Way Road, Norris, TN 37828 or calling him at 865-632-1779. Email address is cfsaylor@tva.gov

WATERSHED ASSISTANCE

Outreach. The National Clean Boating Campaign is a partnership program which highlights the importance of clean water so boating will continue to be fun and safe for future generations. The program demonstrates how boaters can be good stewards of their water environment through best boating and marina practices. The Clean Boating Campaign on Boone Reservoir began in 1999 and on South Holston and Fort Patrick Henry Reservoirs in 2000. Materials were distributed at local marinas that expressed an interest in the program and at public access areas. TVA plans to continue this partnership in upcoming years by working with the marinas, Boone Watershed Partnership, Boone Lake Association, and Friends of Fort Patrick Henry.

The Tennessee Valley Clean Marina Initiative is an effort by TVA to promote environmentally-responsible marina practices. A voluntary program, established in support of the National Clean Boating Campaign, helps marina operators protect the resource that provides them with their livelihood. Laurel Marina on South Holston Reservoir received the Clean Marina award in 2002.

The Boone Watershed Partnership (BWP) was established in August 1995 by TVA. The Boone Watershed Partnership is an organization dedicated to improving water quality and aquatic habitat. It includes agencies, citizens, local governments and others interested in working together to identify pollution problems and solutions within the Boone Watershed. Visit their website at http://www.geocities.com/boonewatershed or call Ken Chase (Chairman) at 423-975-0357 or email: chasekr@xtn.net for more information.

The Boone Lake Association's purpose is to "unite all friends, businesses, organizations, politicians, and corporations who would further and assist in the common cause of keeping Boone Lake clean and pure, not only for now but for generations to come." TVA has supported the association by providing financial support for their litter cleanups. We are helping them expand their program with other projects like the Clean Boating Campaign and riparian buffers and shoreline stabilization demonstrations.

Friends of Fort Patrick Henry is an organization dedicated to improving water quality in Fort Patrick Henry Reservoir. The group is made up of property owners, citizens, and local government agencies. Cleanups are held several times a year. For further information, contact Harry Miles at 423-239-8242, or hmiles@charter.net

The Holston River Watershed Alliance was established in February 2000 by TVA and is developing a shared vision for improved water quality for the greater Kingsport area. For information on how to become involved in this partnership effort, contact Sam Jones (Chairman) 423-239-8225 or Liesa Jenkins 423-246-2017.

Protection and Restoration Activities. TVA provides funding and technical assistance for protection and restoration activities to various organizations in the two counties in the Tennessee portion of the South Fork Holston River Watershed. The Boone Lake Association (BLA) is actively cleaning up Boone Reservoir. TVA provides funding for a winter drift and debris removal as well as regular clean-ups for about 25 high priority camping areas along the reservoir. The association along with other organizations and TVA sponsored a Boone Reservoir cleanup day for the third time in 2002. BLA provides

year-long cleanup with volunteers and paid staff employees. TVA supports the Keep Kingsport Beautiful and Keep Bristol Beautiful Teams in all of its Keep America Beautiful endeavors. TVA supported the 2nd Annual Fort Patrick Henry Lake Cleanup, 3rd Annual Boone Lake Cleanup, 3rd Annual Beaver Creek Cleanup, and 10th Annual South Holston Lake/River Cleanup during 2002. Additional cleanups were conducted on Tranbarger Banch, Madd Branch, and Reedy Creek. TVA, through the Boone Watershed Partnership, partnered with Steele Creek Park in Bristol to complete the second year of a six-year project to stabilize shoreline on Steele Creek Park Lake. TVA continually partners with Sullivan County Park to improve critical shoreline stabilization projects on South Holston Reservoir. A shoreline stabilization project was also completed at Warriors' Path State Park on Fort Patrick Henry Reservoir.

5.2.E. United States Army Corps of Engineers-Nashville District. The geographic boundaries of the Nashville District Corps of Engineers consist of the Cumberland and Tennessee River basins, a combined area of approximately 59,000 square miles. This includes portions of seven states: Tennessee, Kentucky, Alabama, Virginia, Mississippi, Georgia, and North Carolina.

Within the 41,000 square mile Tennessee River Basin, the Nashville District operates a series of navigation locks and has regulatory permit authority over dredge and fill activities under the Clean Water Act and the Rivers and Harbors Act.

Beaver Creek (South Fork Holston River). The Nashville District is performing a Flood Damage Reduction Study to evaluate flood problems occurring in the twin cities of Bristol, Tennessee and Bristol, Virginia. Various construction activities along Beaver Creek have been evaluated to determine the preferred means to alleviate flooding in the Bristol area. These measures include channel widening, bridge removal/replacement, building removal, construction of a diversion tunnel, and modification to an existing dry basin. Bridge removals and/or removals with replacements would reduce flooding by taking out piers and culverts that currently act as impediments to water flow and trap trash and debris. Channel widening would include the construction of a high flow bench approximately one foot above the existing streambed to aid in transport of high waters. In areas where channel widening is considered, in-stream structures would be added to provide variation in water flows and add additional aquatic habitat.

Additional information concerning projects, programs, and activities of the Nashville District Corps of Engineers can be obtained on the World Wide Web at http://www.lrn.usace.army.mil/

5.3. STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

1) Delineate the drinking water source protection area
2) Inventory known and potential sources of contamination within these areas
3) Determine the susceptibility of the water supply system to these contaminants
4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
5) Implement management measures to prevent, reduce or eliminate threats
6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst {limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and spring} since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions are available until 2004). The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Source water assessments were mandated and funded by Congress. Source water protection will be

left up to the individual states and local governments without additional authority from Congress for that progression.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at http://www.state.tn.us/environment/dws as well as other information regarding the Source Water Assessment Program and public water systems.

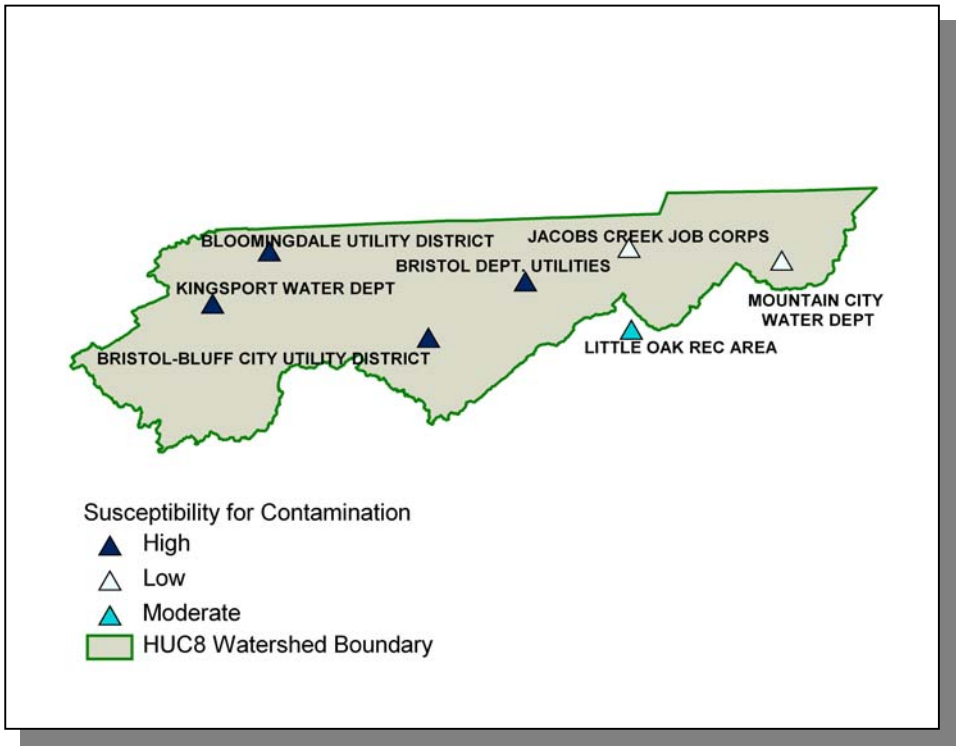

Figure 5-1. Susceptibility for Contamination in the South Fork Holston River Watershed.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at http://www.tdec.net/water.shtml.

5.3.B. State Revolving Fund. TDEC administers the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. TDEC has awarded loans totaling approximately $550 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

TDEC maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

For further information about Tennessee's Clean Water SRF Loan Program, call (615) 532-0445 or visit their Web site at http://www.tdec.net/srf.

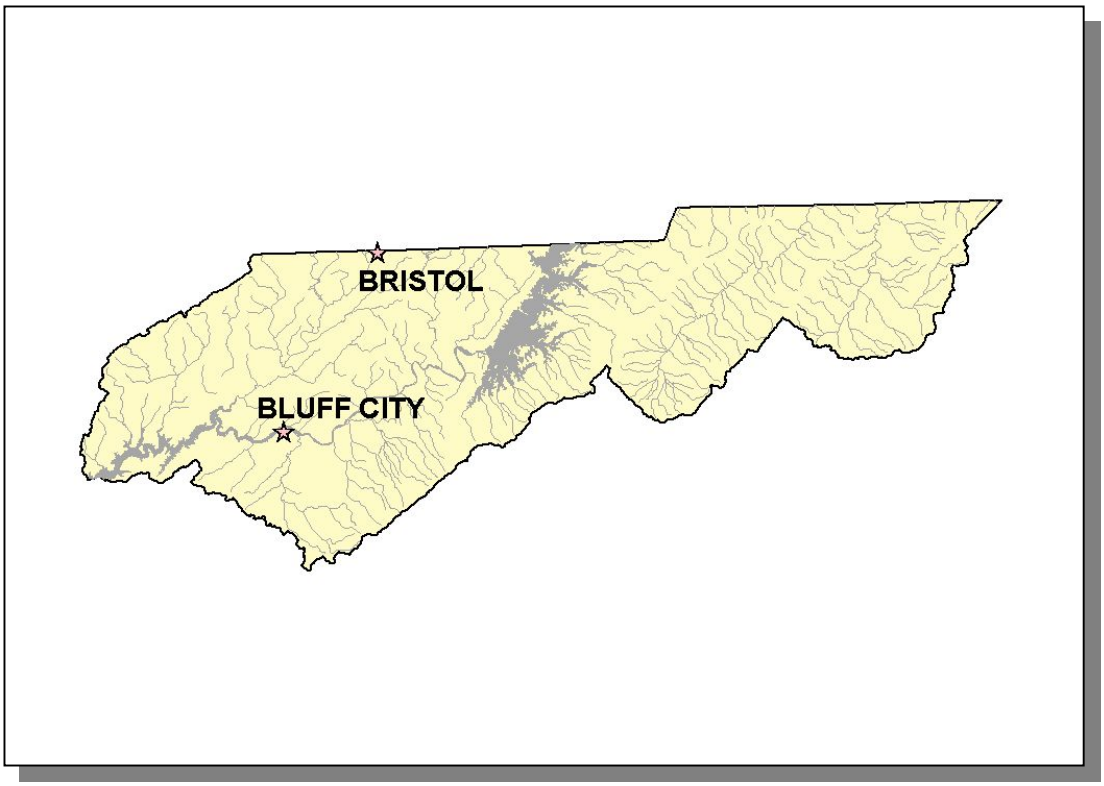

Figure 5-2. Location of Communities Receiving SRF Loans or Grants in the Group 2 Portion of the Tennessee Portion of South Fork Holston River Watershed. *More information is provided in SF Holston-Appendix V.*

5.3.C. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section consists of the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- BMP Implementation Projects. These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the South Fork Holston River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program, and the U.S. Environmental Protection Agency Assistance Agreements C9994674-99-0, C9994674-00-0, and C9994674-01-0.

- Educational Projects. The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information about the joint policy to address Bad Actors in forestry operations is available at http://www.state.tn.us/environment/news/release/jan99/badact.htm

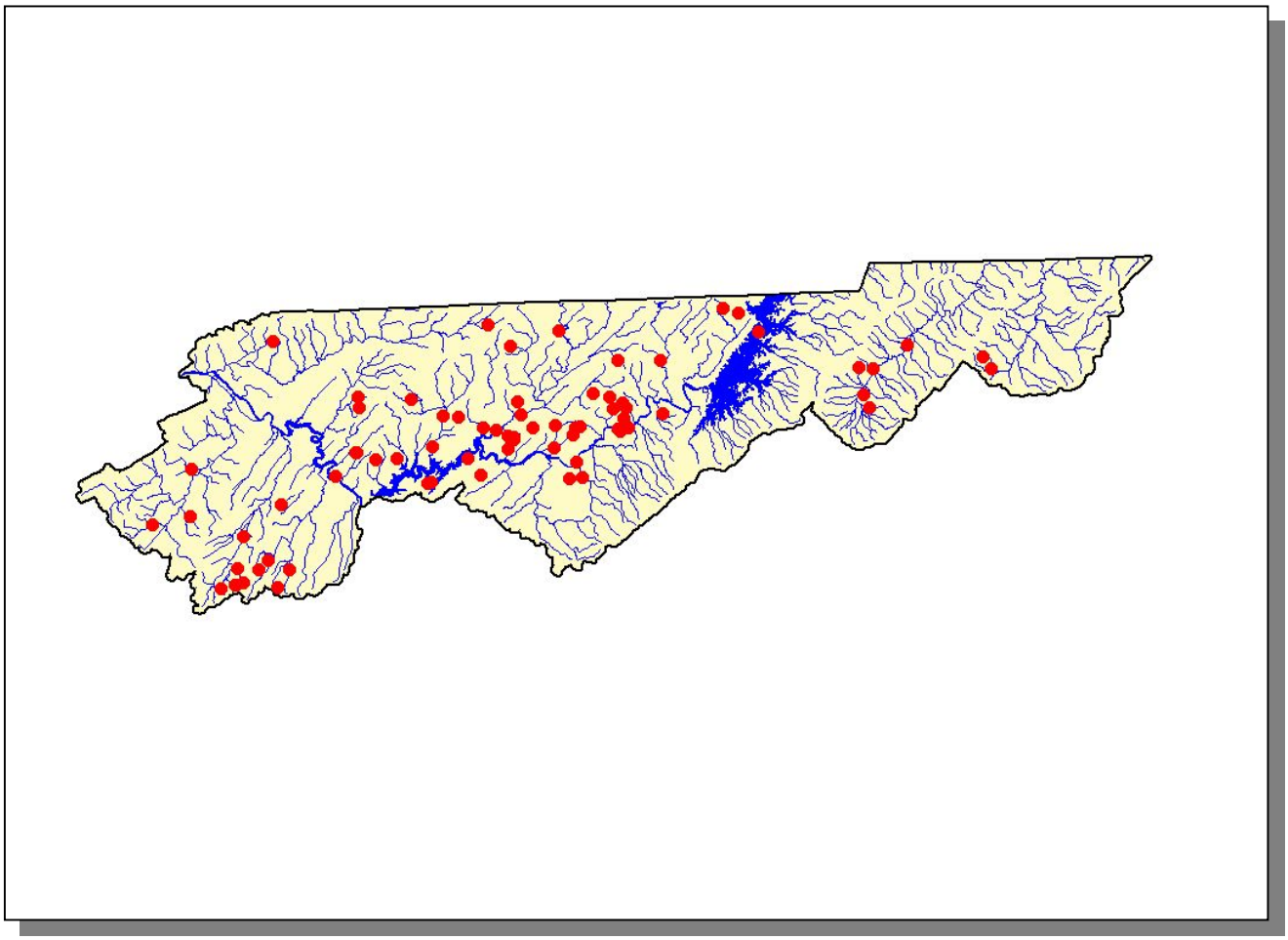

Figure 5-3. Location of BMPs installed from 1999 through 2002 in the South Fork Holston River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in SF Holston-Appendix V.*

5.3.D. Virginia Department of Environmental Quality.

Water Quality Planning Overview. Water quality management planning in Virginia started in 1972, with the passage of the Clean water Act. Section 303(e) of the Law required development of water quality management plans that focused on pollution control and set strategies for its prevention and control on a basin-wide basis. Section 208 of PL 92-500 required area-wide waste treatment management planning for areas having industrial concentrations or other factors.

The State Water Control Board (SWCB) originally adopted the Tennessee-Big Sandy Water Quality Management Plan (WQMP) in 1977 as a regulatory document. The plan was later amended in 1980. In 1998, a draft plan, aimed at updating and replacing the existing Tennessee-Big Sandy WQMP, was developed. Although the 1998 draft went

through a public participation process, as of December 1, 2002, the 1998 draft plan has not been adopted by the State Water Control Board. Water Quality Management Plans in Virginia are in review for deregulation with the exceptions of Total Maximum Daily Load Limits and Permit effluent limits.

Authority for Water Quality Management Planning.

State Law: Section 62.1-44.15(13) of the Code of Virginia authorizes the SWCB to establish policies and programs for effective area wide and basin wide water quality control and management. Section 62.1-44.19:7 of the Code of Virginia authorizes the SWCB to develop and implement a plan to achieve fully supporting status for impaired waters of the state.

Federal Law: Water quality management plans are required by Section 303(e) of the Clean Water Act (CWA) as implemented by 40 CFR 130. In 2002 rules, EPA emphasis is on the Continuous Planning Process and watershed planning.

Purpose of Plan. Plans are intended to provide a management tool for assisting the Commonwealth, local governments, industries and agricultural interest in anticipating, achieving and maintaining applicable water quality goals in the River Basin. Plans need to meet all applicable requirements of 40 CFR 130 for water quality management plans and meet the requirements of the Virginia Water Quality Monitoring, Information and Restoration Act, Section 62.1-44.19-4 et seq. of the Code of Virginia.

In order to meet these legislative needs, the Tennessee Big Sandy Water Quality Management Plan needs to be revised so that it complements the Section 305(b) Virginia Water Quality Assessment Report and the Section 303(d) Total Maximum Daily Load (TMDL) Priority List Report. Serving as a repository for EPA approved TMDL Reports and Implementation Plans for each impaired segment, the Plan would propose control measures and management strategies to address the priority point and nonpoint source water quality problems identified in these two reports.

It is the intention of DEQ staff to periodically update and amend the 1980 version of the Tennessee Big Sandy Water Quality Management Plan with a non-regulatory plan. The draft version developed in 1998 would be the springboard for a new document. Since the 1998 prototype was written, changes to the Clean Water Act, and U.S. Environmental Protection Agency (EPA) guidance specify additional elements that need to be included in water quality management plans. With this in mind, Virginia DEQ staff must make modifications so that not only the Tennessee Big Sandy Water Quality Management Plan is updated, but all Basin Plans reflect current data and scientific studies, new or revised legislation, procedures, policies and regulations, and changes in area growth and development.

Holston River Basin Total Maximum Daily Load Reports. There have been two Fecal Coliform Bacteria Total Maximum Daily Load Reports completed and approved in the Holston River Watershed to date. Four of these are grouped in one report. The report, Fecal Coliform TMDL Development for Cedar, Hall, Byers and Hutton Creeks, is available at the DEQ web site address http://www.deq.state.va.us/tmdl/tmdlrpts.html. These streams are tributaries to Middle Fork Holston River and are located around Meadowview, Emory and Glade Spring in Washington County, Virginia. The other study

that has been approved is Little Creek, a tributary to Beaver Creek, which flows through Bristol, Virginia/Tennessee.

Implementation Plans. In 1998 state legislation, plans to implement approved total maximum daily loads for impaired streams were mandated. The Department of Conservation and Recreation, through a memorandum of understanding with Department of Environmental Quality, have taken a lead role in instances where the sources of impairment are due to non point influences. One such plan has been completed in the Holston River Watershed. That implementation plan is for the Cedar, Hall, Byers and Hutton Creek bacteria TMDL report.

Beginning in June 2000, the Department of Conservation and Recreation (DCR) held meetings with grassroots public participation to develop an Upper Tennessee River Watershed Strategic Plan. The purpose of this document is to assess the quality of waters and to identify ways to make them healthy. Strategies were recommended for the broad categories of land uses that were identified as impacting water quality. An umbrella group, Upper Tennessee River Roundtable, is using this document as a spring-board for writing grant applications to implement some of the recommended strategies.

Future TMDL Studies for the Holston River Watershed. Three TMDL studies are targeted to be completed by April 2004 in the basin. Hutton, Cedar, Hall and Byers Creeks have a benthic TMDL study underway now. Beaver Creek, in Bristol and Washington County, Virginia is scheduled for a TMDL for both bacteria and benthic impairments. North Fork Holston River in Smyth County is on the schedule for a benthic TMDL by April 2004.

DEQ maintains a web site for Total Maximum Daily Load Reports that can be referred to periodically for the latest studies. Current water quality data and assessments are available at the DEQ web site, http://www.deq.state.va.us, as well.

For questions about impaired segments of the Tennessee River Basin headwaters in Virginia, you may contact Nancy T. Norton, P.E. at (276)676-4807 or by e-mail at ntnorton@deq.state.va.us.